

AMENDMENTS TO CLAIMS

Listing Of Claims

1. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing a cyanoacrylate adhesive material formulated to cure in less than about 60 seconds in a temperature of about 20°C to 30°C and an ambient atmosphere;

~~providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the leadframe or the die, and to press the die and the leadframe together with the adhesive material therebetween;~~

applying a volume of the adhesive material in viscous form to the leadframe or to the die;

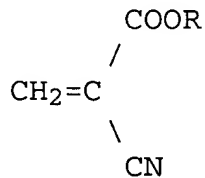
~~using the die attach machine;~~

~~placing the die on the adhesive material using the die attach machine; and~~

pressing the die and the leadframe together with a pressure, the pressure and the volume selected to form an adhesive layer between the die and the leadframe about 0.2 to 2 mils thick; and

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

2. (previously presented) The method of claim 1 wherein the adhesive material has the formula:



wherein R comprises a hydrocarbon group.

3. (previously presented) The method of claim 1 further comprising applying a catalyst to the leadframe, to the die, or to the adhesive material prior to the polymerizing step.

4. (currently amended) The method of claim 1 wherein the pressure is about 75 to 100 grams.
~~leadframe comprises a lead on chip leadframe.~~

5. (currently amended) The method of claim 1 wherein the volume contains about 0.0025 to 0.0011 grams of the adhesive material.
~~further comprising providing a filler in the adhesive material.~~

6. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing a cyanoacrylate adhesive material formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing an in line dispensing mechanism configured to apply a volume of the adhesive material to the leadframe or the die;

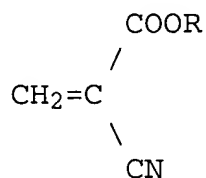
applying the volume of the adhesive material in viscous form to the leadframe or to the die using the dispensing mechanism;

placing the die on the leadframe with the adhesive material compressed between the die and the leadframe with a pressure to form an adhesive layer therebetween, the volume and the pressure selected to form the adhesive layer with a thickness of about 0.2 to 2 mils; and

polymerizing from 90% to 100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

~~to cure the adhesive layer and bond the die to the leadframe.~~

7. (previously presented) The method of claim 6 wherein the adhesive material has the formula:



wherein R comprises a hydrocarbon group.

8. (previously presented) The method of claim 6 wherein the dispensing mechanism comprises a mechanism selected from the group consisting of a syringe dispensing mechanism, a stenciling mechanism, a dip coating mechanism, a spraying mechanism, and a dot shooting mechanism.

9. (previously presented) The method of claim 6 wherein the dispensing mechanism is configured to form a plurality of dots of the adhesive material on the leadframe.

10. (previously presented) The method of claim 6 wherein the adhesive material includes an electrically conductive filler comprising a material selected from the group consisting of Ag, Ni and Fe.

11. (currently amended) The method of claim 6 wherein the volume contains about 0.0025 to 0.0011 grams of the adhesive material and the pressure is about 75 to 100 grams.

~~further comprising applying a catalyst to the leadframe, to the die, or to the adhesive material prior to the polymerizing step.~~

12. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe comprising a mounting paddle;

providing an adhesive material in viscous form comprising a cyanoacrylate adhesive formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing a die attach machine configured to align the die to the mounting paddle, to apply the adhesive material to the mounting paddle and to press the die and the mounting paddle together with the adhesive material therebetween;

applying a volume containing about 0.0025 to 0.0011 grams of the adhesive material to the mounting paddle using the die attach machine;

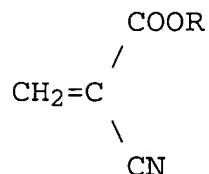
placing pressing the die on the adhesive material with a pressure of about 75 to 100 grams using the die attach machine; and

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe at the temperature and in the ambient atmosphere in less than about 60 seconds.

13. (currently amended) The method of claim 12 wherein following the polymerizing step the adhesive material comprises an adhesive layer having a thickness of about 0.2 to 2 mils.

~~further comprising applying a catalyst to the leadframe, to the die or to the adhesive material prior to the polymerizing step.~~

14. (previously presented) The method of claim 12 wherein the adhesive material has the formula:

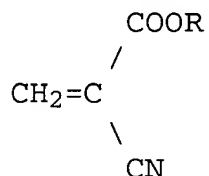


wherein R comprises a hydrocarbon group.

15. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing an adhesive material having the formula:



wherein R is a hydrocarbon group, the adhesive material formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

~~providing a system comprising a leadframe feed mechanism configured to manipulate the leadframe, a vacuum tool configured to manipulate the die, an alignment device configured to align the die to the leadframe, and a dispensing mechanism configured to dispense the adhesive material on the leadframe or the die;~~

applying a volume containing about 0.0025 to 0.0011 grams of the adhesive material in a viscous form to the leadframe or to the die; ~~using the leadframe feed mechanism and the dispensing mechanism;~~

placing the die on the leadframe with the adhesive material compressed between the die and the leadframe with a pressure of about 75 to 100 grams; and ~~using the vacuum tool and the alignment device; and~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

16. (currently amended) The method of claim 15 wherein following the polymerizing step the adhesive material has a thickness of about 0.2 to 2 mils.

~~the system comprises a die attach machine.~~

17. (previously presented) The method of claim 15 wherein the adhesive material comprises a filler comprising a material selected from the group consisting of SiO₂, Al₂O₃, AlN, Ag, Ni, Fe, SiC, and polystyrene coated Ni.

18. (previously presented) The method of claim 15 wherein the leadframe comprises a mounting paddle for supporting the die and the applying step comprising applying the adhesive material to the mounting paddle.

19. (previously presented) The method of claim 15 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers configured for wire bonding to the die and for supporting the die.

20. (currently amended) The method of claim 15 wherein following the polymerizing step an adhesion force of the die to the leadframe is about 1.7 kg.

~~the dispensing mechanism comprises a mechanism selected from the group consisting of a syringe dispensing mechanism, a stenciling mechanism, a dip coating mechanism, a spraying mechanism, and a dot shooting mechanism.~~

21. (currently amended) A method for packaging a semiconductor die comprising:

providing a leadframe;

providing an adhesive material comprising an anaerobic acrylic formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

~~providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the leadframe or the die, and to press the die and the leadframe together with the adhesive material therebetween;~~

applying a volume of the adhesive material in viscous form to the leadframe or to the die;
~~using the die attach machine;~~

placing the die on the leadframe with the adhesive material compressed between the die and the leadframe with a pressure, the pressure and the volume selected to form an adhesive layer about 0.2 to 2 mils thick; and
~~using the die attach machine; and~~

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe in less than about 60 seconds.

22. (currently amended) The method of claim 21 wherein the volume contains about 0.0025 to 0.0011 grams of the adhesive material and the pressure is about 75 to 100 grams.

~~further comprising accelerating the polymerizing step using ambient humidity on the leadframe or the die.~~

Claims 23-39 (canceled)

40. (previously presented) The method of claim 21 further comprising applying a catalyst to the leadframe, to the die, or to the adhesive material prior to the polymerizing step.

41. (previously presented) The method of claim 21 wherein the leadframe comprises a lead-on-chip leadframe comprising a plurality of lead fingers configured for wire bonding to the die and for supporting the die.

42. (currently amended) A method for packaging a semiconductor die comprising:

providing a ~~lead-on-chip~~ leadframe;
~~comprising a plurality of lead fingers configured to support the die and comprising a plurality of bonding sites;~~

providing an adhesive material comprising a cyanoacrylate adhesive or an anaerobic acrylic formulated to cure in less than about 60 seconds at a temperature of about 20°C to 30°C and in an ambient atmosphere;

providing a filler in the adhesive material selected to tailor a characteristic of the adhesive material;

providing a die attach machine configured to align the die to the leadframe, to apply the adhesive material to the leadframe, ~~fingers,~~ and to press the die and the lead fingers together with the adhesive material therebetween;

applying about 0.0025 to 0.0011 grams of the adhesive material in viscous form to the lead fingers using the die attach machine;

placing pressing the die on and the leadframe together with a pressure of about 75 to 100 grams with the adhesive material in contact with the die and the ~~lead fingers~~ leadframe using the die attach machine; and

polymerizing from 90-100% of the adhesive material without heating the die and the leadframe at the temperature and in the ambient atmosphere in less than about 60 seconds to form an adhesive layer about 0.20 to 2 mils thick.

+

~~wire bonding the die to the bonding sites; and~~

~~—encapsulating the die and at least portions of the lead fingers.~~

43. (previously presented) The method of claim 42 wherein the filler comprises an electrically insulating material.

44. (previously presented) The method of claim 42 wherein the filler comprises an electrically conductive material.